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The SIAM Conference on Dynamical Systems was designed to provide a forum for the continued interdisciplinary development of the modern theory of dynamical systems. The close connections between theory, numerics, and applications has had a revolutionizing effect on the growth of dynamical systems as a field. The conference successfully met its primary goal of drawing members from the dynamical systems community together to discuss recent achievements both in the general geometric theory of dynamical systems, as well as in problem-specific developments.

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Final Technical Report

SIAM Conference on Dynamical Systems
May 7-11, 1990 Marriott Hotel, Orlando, FL

The SIAM Conference on Dynamical Systems was designed to provide a forum for the continued interdisciplinary development of the modern theory of dynamical systems. The close connections between theory, numerics, and applications has had a revolutionizing effect on the growth of dynamical systems as a field. The conference successfully met its primary goal of drawing members from the dynamical systems community together to discuss recent achievements both in the general geometric theory of dynamical systems, as well as in problem-specific developments.

Invited (plenary) presentations provided overviews of areas of theoretical development, as well as nontechnical surveys of specific application areas. Through the many minisymposia that were organized, there was sufficient "critical mass" of expertise in certain applications areas to promote a productive exchange of new ideas. In particular, under the umbrella of the SIAM Dynamical Systems Conference, there were "conferences within the conference" on fluid dynamics, complexity/chaos, population dynamics, computation, image processing/computer vision, biological modeling, and industrial applications. Sessions for contributed papers and poster presentations provided a full range of opportunity communicating recent developments.

Invited presentations were given by:

Alfred Hubler, University of Illinois, Urbana
Resonant Stimulation and Control of Complex Systems

Kunihiko Kaneko, University of Tokyo
Simulating Science with Coupled Map Lattices

Arje Nachman, Air Force Office of Scientific Research
Air Force Interest and Funding in Nonlinear Dynamical Systems

Marc A. Berger, Georgia Institute of Technology
Generating Wavelets vs Attractors of Random Dynamical Systems

John W. Cahn, National Institute of Standards and Technology
Diffusional Phase Transformations in Solids

Jack K. Hale, Georgia Institute of Technology
Dynamics for Thin Domain

Nancy Kopell, Boston University
Tracking Invariant Manifolds in Singularly Perturbed Systems

John Mallet-Paret, Brown University
Global Properties of Delay-Differential Equations

George R. Sell, University of Minnesota
Approximation Dynamics: Inertial Manifolds and Hyperbolic Sets

Katepalli R. Sreenivasan, Yale University
The Dynamics and Geometry of Unconfined Flows

John Rinzel, National Institutes of Health
Multiple Time Scales in Biological Bursting Oscillations

James A. Yorke, University of Maryland, College Park
Do Computer Trajectories of Chaotic Systems Represent True Trajectories?

Minisymposium topics and organizers were:

Alfred Hubler, University of Illinois, Urbana
Control of Chaos (part 1 of 4) Modeling and Control of Low Dimensional Chaos

Paul Waltman, Emory University
Applications to Population Biology (part 1 of 2)

Helena S. Wisniewski, Lockheed Corporation
Mathematical Models for Microstructural Evolution: Tools for the Intelligent Processing of Materials

Ittai Kan, George Mason University
Magnetic Dynamos (part 1 of 2)

Marc A. Berger, Georgia Institute of Technology
Graphics, Imaging and Vision (part 1 of 2)

Martin Casdagli, Santa Fe Institute
Modeling and Forecasting Time Series; A Dynamical Systems Approach

Michael C. Mackey, McGill University
Understanding Biological Dynamics; The Nonlinear Perspective (part 1 of 3)

Marc A. Berger, Georgia Institute of Technology
Graphics, Imaging and Vision (part 2 of 2)

Mitchell Luskin, California Institute of Technology
The Computation of Dynamical Systems (part 1 of 2)

Donald L. Turcotte, Cornell University, and John B. Rundle, Sandia National Laboratories
Application of Dynamical Systems to the Understanding of Earthquakes

Kathleen Alligood, George Mason University
Fractal Basin Boundaries

Alfred Hubler, University of Illinois, Urbana
Control of Chaos (part 2 of 4) Control of High Dimensional Nonlinear Systems

Paul Waltman, Emory University
Applications to Population Biology (part 2 of 2)

Helena S. Wisniewski, Lockheed Corporation
Aerospace Design (part 1 of 2)

Basilis Gidas, Brown University
Statistical Methods in Image Processing and Computer Vision

Ittai Kan, George Mason University
Magnetic Dynamos (part 2 of 2)

Thomas Warn, McGill University
Nonlinearities in the Atmospheric Sciences

Wallace E. Larimore, Computational Engineering, Inc.
Stochastic Chaos - State Space Modeling from Empirical Data

Jayant Shah, Northeastern University
Nonlinear Models in Image Processing

Stephen B. Margolis, Sandia National Laboratories
Applications of Dynamical Systems in Combustion Theory

Eric Kostelich, Arizona State University
Noise Reduction and Models of Dynamical Systems

Michael C. Mackey, McGill University
Understanding Biological Dynamics; The Nonlinear Perspective (part 2 of 3)

Peter W. Bates, Brigham Young University
Metastable Dynamics in Physical Systems (part 1 of 2)

Mitchell Luskin, California Institute of Technology
The Computation of Dynamical Systems (part 2 of 2)

J. Brindley, University of Leeds
Nonlinear Dynamics of Rotating Fluid Flows

Jeffrey Geronimo, Georgia Institute of Technology
Fractals and Their Dimensions

Alfred Hubler, University of Illinois, Urbana
Control of Chaos (part 3 of 4) Adaptive Control of Nonlinear Dynamics

Herbert W. Hethcote, University of Iowa
Mathematical Epidemiology (part 1 of 3)

Helena S. Wisniewski, Lockheed Corporation
Aerospace Design (part 2 of 2)

John A. Simmons, United State Department of Commerce National Institute of Standards and Technology
Dynamical Systems in Crystalline Structures

Peter W. Bates, Brigham Young University
Metastable Dynamics in Physical Systems (part 2 of 2)

Alfred Hubler, University of Illinois, Urbana
Control of Chaos (part 4 of 4) Nonlinear Resonance Spectroscopy

Herbert W. Hethcote, University of Iowa
Mathematical Epidemiology (part 2 of 2)

Kenneth Palmer, University of Miami
Hyperbolicity in Dynamical Systems (part 1 of 2)

Robert Cawley, Naval Surface Warfare Center
Geometric Theory and Dynamics of Model Systems

Helena S. Wisniewski, Lockheed Corporation
The Dynamics of Neural Networks and Their Applications

Michael F. Shlesinger, Office of Naval Research
Fractal Time Dynamics

Steven M. Shaw, Michigan State University
Nonlinear Mechanical Systems

K.R. Sreenivasan, Yale University
Dimensional Estimates and Extraction of Low-Dimensional Models

Michael C. Mackey, McGill University
Understanding Biological Dynamics; The Nonlinear Perspective (part 3 of 3)

Hoseyin Kocak, University of Miami
Computer Programs for Dynamical Systems

Celso Grebogi, University of Maryland, College Park
Fractals in Fluids

Alex J. Dragt, University of Maryland, College Park
Lie and Differential Algebraic Methods in Accelerator Physics

Thomas J. Taylor, Arizona State University
Dynamical Systems and Stochastic Processes

Herbert W. Hethcote, University of Iowa
Mathematical Epidemiology (part 3 of 3)

Kenneth Palmer, University of Miami
Hyperbolicity in Dynamical Systems (part 2 of 2)

Edward Ott, University of Maryland, College Park
Chaotic Scattering

George F. Carnevale, Scripps Institute of Oceanography
The Role of Coherent Structures in Two-Dimensional Turbulence

This conference represented the first activity sponsored by the recently created SIAM Activity Group on Dynamical Systems. Although early predictions estimated 250-300 participants, the conference drew 427 registered attendees, of which 357 were from the United States and 70 were from foreign countries.
Of the 427 total attendees, 26 were from government, 67 from industry, 334 from academia, representing 6%, 16%, and 78%, respectively.

The SIAM Review is now pursuing the publication of survey articles based on certain of the invited presentations. The minisymposia on industrial applications will be featured in the early volumes of the new book series "Technology Acceleration" to be published by SIAM, and announced at the conference. Based on discussions initiated at a conference minisymposium on small-scale computing, consideration is being given to the development of "clearing-house" for the distribution of dynamical systems software available from members of the dynamical systems community.

Submitted by:

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